

CHAPTER 8. CONSUMER ANALYSIS

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CHAPTER 8. CONSUMER ANALYSIS

8.1 INTRODUCTION TO CONSUMER ISSUES

As part of the process of setting a new energy efficiency standard for clothes washers, legislation requires that "the Secretary consider, among other factors,...if any lessening of the utility or the performance of the products is likely to result from the imposition of the standard (42 U.S.C. Sec. 6295 (o) (2) (B) (I) (IV)). In order to better inform the clothes washer standards rulemaking relating to consumer issues, the Department decided to follow the recommendations made by the Consumer Subcommittee of the Advisory Committee in December of 1997:

Adopt a three-step process of obtaining background research, holding focus groups, and conducting interviews/surveys.

The Department first conducted an extensive review of secondary sources of information on consumers and clothes washers (see Appendix I). The information was compiled by the Lawrence Berkeley National Laboratory and made available at a March 11, 1998, public workshop attended by manufacturers, trade associations, energy efficiency groups, and other stakeholders.

This study was the subject of a review to determine if secondary studies provided adequate information to enable the Department to determine the value consumers placed on different clothes washer attributes. It was the consensus of the workshop participants that the secondary findings were inadequate because the samples contained in the surveys were not representative of the nation, not all the relevant clothes washer attributes were covered, and the methodologies of the different surveys were not comparable. A Clothes Washer Consumer Analysis Working Group (Working Group) was formed representing manufacturers, energy efficiency groups, national laboratories, and other stakeholders. In addition to developing a list of relevant clothes washer attributes, the Working Group reviewed different approaches such as focus groups, surveys, and a conjoint analysis. (A conjoint analysis is research technique that lets the consumer determine the combination of features that the product (or service) must have to appeal to them.)

In order for the Department to conduct a consumer survey and/or focus group, the Paper Reduction Act of 1995 requires that the Department seek comments on the proposed information collection in a Federal Register notice, and seek Office of Management and Budget (OMB) approval through submission of the form OMB 83-1 upon completion of the comment period of the Federal Register notice.

DOE received a number of comments concerning the impact of the rule on low-income consumers and the elderly. In response to the concerns raised, the Department added a questionnaire to the conjoint analysis survey phase of the consumer analysis study to better understand how increases in the price of high-efficiency clothes washing machines would impact low-income and elderly consumers. See Appendix J for the full text of the consumer issues report. In addition, separate LCCs were done for the sub-groups of senior and low income consumers to assess if either

of these subgroups would be adversely impacted by the expected increased cost of high efficiency clothes washers. See Appendices K & L for detailed charts on life-cycle cost and payback periods.

8.2 FOCUS GROUPS AND CONJOINT ANALYSIS

The clothes washer consumer analysis was completed in two steps. In the first step, ten focus groups were held in five regions of the country to develop a list of clothes washer attributes valued by consumers. In the second step, the six attributes cited most often by the focus groups that were likely to be affected by an efficiency standard were included in a conjoint analysis survey given to 400 respondents in four regions of the country (100 respondents per region).

Conjoint analysis is a stated preference technique that requires respondents to trade-off different attributes against each other. By examining how respondents make these tradeoffs, the relative values placed on the clothes washer attributes can be determined. This enables the Department to empirically determine if consumers feel a change in any of the six attributes due to the new energy efficiency standard would lesson the utility of the machines.

8.2.1 Results of Focus Groups and Conjoint Analysis

The focus group and conjoint results indicate that price is the most important attribute when consumers are purchasing a new clothes washer, although in each case another attribute is virtually tied with price in terms of importance. In the focus groups, 83 percent of the respondents included price in their top ten list of important clothes washer attributes, while 81 percent included wash tub capacity in that same list. In the conjoint analysis, price had the highest relative importance score (26 percent), followed closely by the availability of a wash load size option on the control panel (25 percent). Of the six attributes included in the conjoint analysis survey, door placement was the fifth most important attribute with a relative importance score of 11 percent.

In the likelihood of purchase scenarios, the purchase probabilities were more sensitive to price than any of the other washer attributes.^a While the shift from a standard to a high efficiency machine resulted in a drop in the estimated purchase probability, this was due to the change in price rather than to changes in the other attributes. When price was held constant at the standard efficiency level and the other attributes were allowed to change to reflect a high efficiency machine, the likelihood of purchase increased. This is due to the fact that consumers value energy savings more than top load door placement.

^aPurchase probabilities indicate the likelihood a consumer will purchase a particular clothes washer, assuming (s)he has made the decision to buy a new clothes washer. For example, 59% of the full sample would be willing to purchase the standard efficiency clothes washer.

The purchase probability findings indicate that low-income consumers and elderly consumers were slightly more likely to purchase a high efficiency, front-load washing machine than the full sample. When the analysis focused exclusively on the impacts of clothes washer prices increasing, the data indicated that a smaller percentage of low-income consumers would be willing or able to purchase machines in the \$650 price level, when compared to the full sample. There was no statistical difference between elderly consumers and the full sample at the \$650 level. While the data from the price impact questions indicate that low-income consumers are more adversely affected by higher clothes washer prices than the sample as a whole, the Department is unable to determine the magnitude of the impact on future clothes washer purchases using the survey data. For instance, the consumer analysis survey found that approximately half of the low-income respondents currently do not own a clothes washer, while more than three-quarters of the respondents making more than \$25,000 annually own a washing machine. The Department is unable to determine if this ratio would change with a price increase due to the proposed standards. The fact that the survey found low-income consumers are more likely to use store financing plans, such as no interest for one year, to purchase a clothes washing machine than the sample as a whole further clouds the magnitude of the new standards' impact on low-income consumers because store financing encourages consumers to purchase high price products by allowing payments to be paid over a number of months. For the entire focus group and conjoint report see Appendix J.

8.3 CONSUMER SUB-GROUP ANALYSIS

The consumer analysis evaluated households with low income levels and senior households, who may be disproportionately affected by any national energy efficiency standard level. This was accomplished by analyzing the life-cycle cost and payback periods for those subgroups of households. The spreadsheet model used for the LCC analysis can be used with different data inputs. Among the inputs are the data from the 1993 RECS published by the EIA. The standard LCC analysis (described in Chapter 7) includes all the households having both a washer and a dryer.

The subgroups analyzed to see if they were impacted differently than the general population were seniors and the poor. Seniors is defined as head of household over 65. Poor is defined as at 100% of poverty level. These subgroups were modeled by using the LCC spreadsheet model by only sampling the poor and senior head of household subgroups separately.

8.3.1 Life-Cycle Cost & Payback Results for Subgroups

Table 8.1 below summarizes the LCC results for senior and low-income subgroups, as well as comparing them to the total sample of RECS households used in the overall analysis.

Table 8.1 Consumer Subgroup LCC Savings and Percent of Households Benefitting

Trial Standard Level	MEF	Sample Households Benefitting			Average LCC Savings		
		Total (%)	Senior (%)	Low income (%)	Total (\$)	Senior (\$)	Low income (\$)
1	1.021	84	79	85	61	41	69
2	1.089	87	80	88	211	137	243
3	1.04 in 2004	90	84	90	103	68	118
	1.26 in 2007	81	72	81	260	147	310
4	1.257	79	71	81	242	132	289
5	1.362	80	70	80	243	130	287
6	1.634	69	55	71	176	61	227

The two consumer subgroups show the same trend in average LCC savings and percent of sample households benefitting as the total sample of households.

For the low-income subgroup the percentage of households benefitting from standards is either the same or greater than for the general population. This can be explained by looking at the cycles per year (i.e., washer loads) used in determining the LCC. This number is estimated from the number of occupants in a household. Our RECS sample of low income households showed a greater number of people per household and we calculated 410 cycles per year, greater than the 392 used for the general population.

The senior household subgroup had less people per household, and therefore had less wash loads per year (on average 299 wash loads per year or 24% less wash loads). Therefore, seniors benefitted somewhat less from standards.

Other differences that could explain changes in LCC and the percentage in a subgroup benefitting from standards are other factors that determine the amount spent on fuel. Fuel costs are higher if electric water heaters and dryers are used instead of gas. The geographic location of these populations and the price they pay for fuel also affect the number of households in a subgroup benefitting. These differences were small when compared to the differences in LCC due to the cycles per year between the subgroups and the total sample population.

An analysis on the effects on payback period by subgroup are shown in Table 8.2 below. In agreement with the LCC results, the payback periods for the low income subgroup were somewhat shorter than for the overall population, while the payback periods were somewhat longer for the senior subgroup. The primary reason for the differences in payback period is the same as for the LCC analysis; the differences in wash loads per year.

Table 8.2 Consumer Subgroup Payback Period Comparisons

Trial Standard Level	MEF	Average Payback Period in Years		
		Total RECS Sample	Senior	Low income
1	1.021	4.4	5.4	4.4
2	1.089	5.0	6.4	4.9
3	1.04 in 2004	4.6	5.7	4.5
	1.26 in 2007	6.8	8.4	6.5
4	1.257	7.0	8.7	6.8
5	1.362	7.0	8.8	6.9
6	1.634	8.7	10.9	8.4

Figures 8.1 and 8.2 below graphically depict the results shown in Tables 8.1 and 8.2.

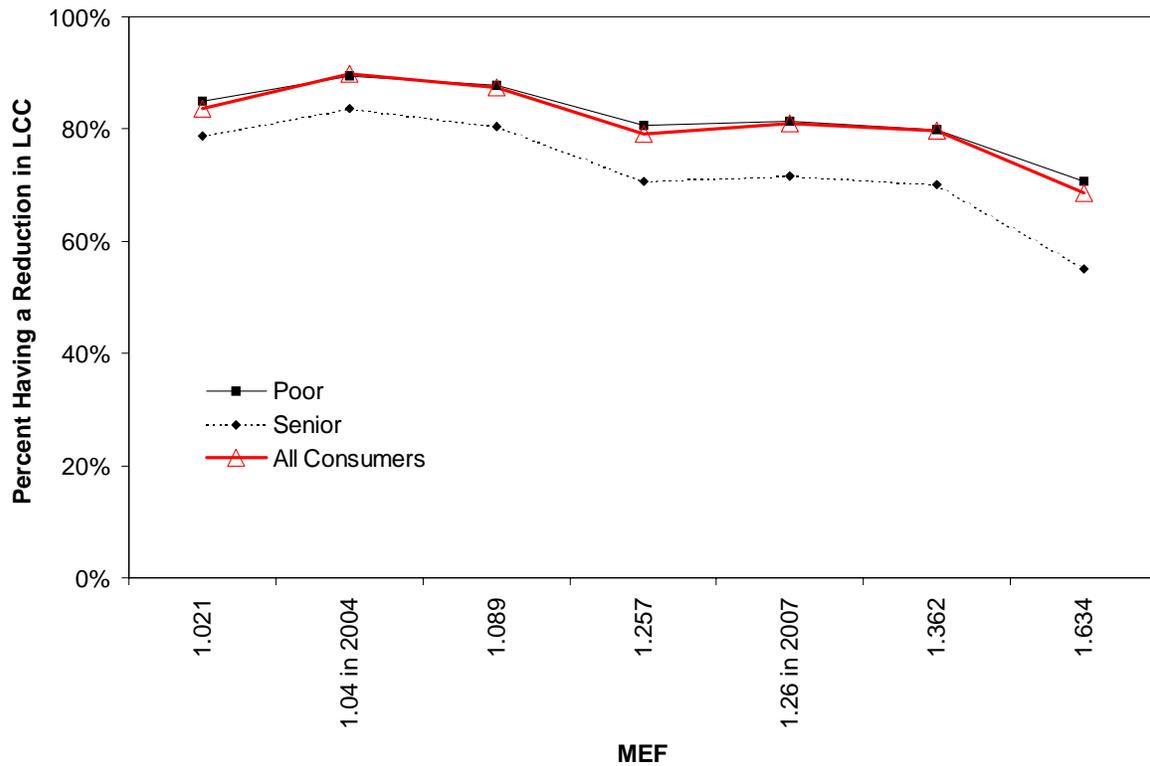


Figure 8.1 Summary of Subgroup Life-Cycle Costs

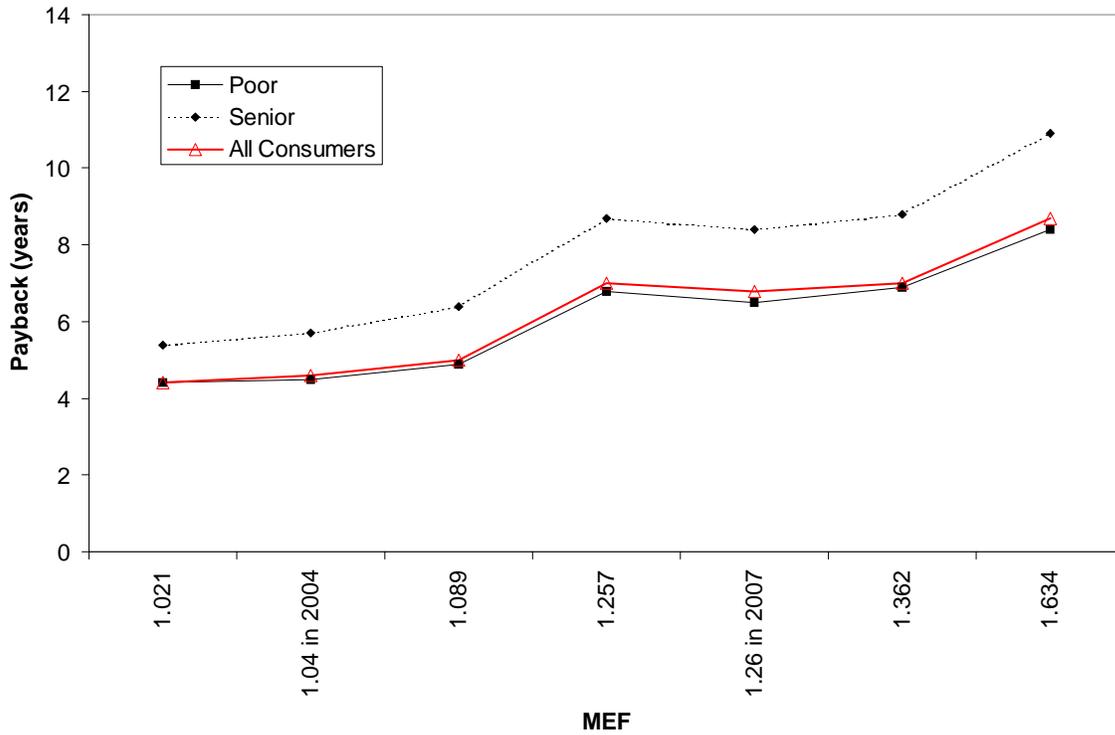


Figure 8.2 Summary of Subgroup Payback Periods

Tables 8.3 and 8.4 show the LCC results for the low income subgroup and for the senior consumer subgroup in greater detail. Percentiles from 0 to 100% including the median (50th percentile) are shown. For individual distribution charts for each standard level see Appendix K.

Table 8.3 Summary of LCC Results – Low Income

Trial Standard Level	MEF	Change in LCC from Baseline Shown by Percentiles of the Distribution of Results (values in 1997\$)								Percent with LCC Less than Baseline
		0	10	25	50	75	90	100	Mean	
1	1.021	(520)	(172)	(107)	(56)	(22)	19	141	(69)	84.9
2	1.089	(1,941)	(563)	(360)	(191)	(67)	13	143	(243)	87.8
3	1.04 in 2004	(722)	(272)	(177)	(93)	(36)	1	123	(118)	89.5
	1.26 in 2007	(2,860)	(809)	(509)	(245)	(52)	91	626	(310)	81.4
4	1.257	(2,695)	(773)	(484)	(231)	(43)	100	632	(289)	80.7
5	1.362	(2,700)	(771)	(486)	(226)	(41)	104	682	(287)	79.9
6	1.634	(2,520)	(727)	(428)	(167)	30	188	661	(227)	70.6

Table 8.4 Summary of LCC Results – Senior (head of household over 65)

Trial Standard Level	MEF	Change in LCC from Baseline Shown by Percentiles of the Distribution of Results (values in 1997\$)								Percent with LCC Less than Baseline
		0	10	25	50	75	90	100	Mean	
1	1.021	(455)	(112)	(68)	(38)	(10)	31	132	(41)	78.8
2	1.089	(1,831)	(352)	(213)	(106)	(20)	41	151	(137)	80.4
3	1.04 in 2004	(733)	(168)	(103)	(53)	(16)	17	131	(68)	83.7
	1.26 in 2007	(2,711)	(490)	(280)	(113)	16	155	626	(147)	71.7
4	1.257	(2,541)	(462)	(263)	(104)	22	165	640	(132)	70.6
5	1.362	(2,566)	(467)	(266)	(104)	25	186	683	(130)	70.1
6	1.634	(2,225)	(407)	(199)	(33)	118	260	652	(61)	55.0

Detailed results of the payback periods are shown in Tables 8.5 and 8.6 below. Individual charts are provided in Appendix L.

Table 8.5 Summary of Payback Period Results – Low Income

Trial Standard Level	MEF	Payback Period Shown by Percentiles of the Distribution of Results (values in years) (\$)							
		0	10	25	50	75	90	100	Mean
1	1.021	0.0	0.1	0.2	0.7	5.8	12.6	73.7	4.4
2	1.089	0.0	0.8	1.8	3.6	6.3	10.5	45.6	4.9
3	1.04 in 2004	0.1	0.8	1.7	3.2	5.8	9.6	59.8	4.5
	1.26 in 2007	0.8	2.0	2.8	4.6	7.8	13.0	116.9	6.5
4	1.257	0.9	2.1	2.9	4.8	8.1	13.5	117.0	6.8
5	1.362	0.8	2.1	2.9	4.8	8.3	13.6	124.8	6.9
6	1.634	1.1	2.8	4.0	6.5	10.4	16.7	82.2	8.4

Table 8.6 Summary of Payback Period Results – Senior

Trial Standard Level	MEF	Payback Period Shown by Percentiles of the Distribution of Results (values in years) (\$)							
		0	10	25	50	75	90	100	Mean
1	1.021	0.0	0.2	0.3	0.7	7.9	16.3	72.2	5.4
2	1.089	0.0	1.1	2.6	5.3	8.6	12.4	51.9	6.4
3	1.04 in 2004	0.1	1.2	2.5	4.6	7.5	11.6	63.7	5.7
	1.26 in 2007	0.8	3.0	4.2	6.3	10.1	16.3	101.8	8.4
4	1.257	0.9	3.1	4.3	6.5	10.4	16.9	102.9	8.7
5	1.362	0.9	3.1	4.3	6.5	10.4	17.7	116.0	8.8
6	1.634	0.9	4.1	5.9	8.9	13.7	20.0	91.7	10.9

8.3.2 Data Used in the Consumer Subgroup Analysis

Table 8.7 shows how the input parameters varied among the senior and low-income households and how these compared to the total RECS sample. Other than the sample size the main the senior and low-income subgroups differ from the overall sample mainly by the number of wash loads or cycles per year. This is a number derived from the number of occupants in a RECS household and is discussed in Chapter 7. Shown here are variables that can vary due to differences in RECS households. Other variables explained in chapter 7 such as lifetime of appliance and discount rate and water price are distributions that are held constant in the subset analysis. The parameters that are variable and dependent on data from a RECS household sample are: cycles per year (derived from occupants per household), fuel type, and fuel cost.

Table 8.7 Profile of RECS Households for Entire Sample and Subgroups

Category	Total RECS Sample	Senior	Low income
# of RECS housing Records Un-weighted	4396	867	357
sum of weights	59,407,035	13,113,765	4,858,585
Percent of Population Weighted	100.0%	22.1%	8.2%
Cycles per Year (derived from occupants per household)	392	299	410
Marginal Fuel Cost (2007)			
Electricity (cents/Kwh)	\$7.67	\$7.70	\$7.40
Gas (\$/MMBtu)	\$5.85	\$5.85	\$5.66
Oil (\$/MMBtu)	\$7.87	\$7.95	\$7.88
LPG (\$/MMBtu)	\$14.44	\$9.90	\$10.97
Percentage of Households with these WH/Dryer Fuel Types			
Elect. / Elect.	40.3	40.1	41.0
Elect./ Gas	0.5	0.5	1.3
Gas / Elect.	33.9	33.0	36.3
Gas / Gas	18.5	19.4	14.8
Oil / Elect.	3.7	3.8	1.6
Oil / Gas	0.2	0.2	0.2
LPG / Elect.	2.9	3.0	4.8